REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claim 13 is currently being amended.

This amendment changes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 13-19 and 34 are now pending in this application.

Claim Rejections under 35 U.S.C. § 112

Claims 13 and 15 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In response, without agreeing or acquiescing to the rejection, Applicants have amended claim 13 to adhere to the requirements under 35 U.S.C. § 112, second paragraph. Concerning claim 15, Applicants respectfully submit that no antecedent basis is required for the limitation "one of a plurality of MEMs devices" since it is first recited in line 4 of claim 15. Accordingly, Applicants request that the rejection be withdrawn and claims 13 and 15 be allowed.

Claim 34 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Office Action asserts that the written description fails to disclose the corresponding structure, material or acts for the claimed function. Applicants respectfully disagree.

Applicants refer the Examiner to Figs. 1, 2, 5, 6, 8 and 9 and pages 3-5 of the application as filed. Specifically, the Examiner is referred to the following passages:

[0001] Mircro-electromechanical systems (MEMS) exist which combine mechanical devices, such as mirrors and actuators, with electronic control circuitry for controlling the mechanical devices. ***One such device is referred to as a diffractive light device (DLD), and includes a variable capacitor composed of a fixed reflective ground plate and a semi-transparent, electrostatically movable second plate.*** The variable gap between the plates produces a desired interference or diffraction of light passing therein, which can be used for spatial light modulation in high resolution displays and for wavelength management in optical communication systems.

[0018] The current controller 100 includes an input for receiving a control signal (e.g., enabling control signal (EN)), a current mirror having MOS devices 130 and 160, and a pull-up MOS device 170 coupled to the current mirror and configured to disable the output of the current mirror (e.g., raise a gate voltage of MOS 130) when the transmission gate 140 disables the current mirror. An inverter 110 may or may not be provided, depending on the particular type of transmission gate 140 used or if the control signal(s) are generated on the periphery of the array and routed to the array. ***Thus, the controlled current outputs are variable voltage compliant.*** Further, it should be appreciated that, while transmission gate 140 is shown as one type of current mirror enabler, other components may also be used, such as a pmos or nmos type device. With the aforementioned structure, however, the current controller 100 may have a footprint not greater than 20 u^2 per MEMs device 150. Note that enabler device 140 in this embodiment has the purpose of coupling or decoupling the gates of 160 and 130 when the current mirror output (drain of 130) is "off". When the current mirror is off, the gate of device 130 is prevented from floating (to stop current from flowing out of the drain of 130), so MOS device 170 is used to fully turn off 130. Note that devices 130 and 170 are included because, in a large array, there would be one of devices 160 & 120 per column, and one of devices 140, 170, and 130 in each pixel in each column. Since a charge is "written" a row at a time, it is desired to have only one device 130 in a particular column "on" at any given time. Consequently, it is desired that the gate of device 160 and the gate of only ONE device 130 in the column be coupled together at any given time.

[0019] The current mirror is configured to mirror a reference current onto a controlled current output for MEMs device 150. In this regard, ***the reference current may be generated by an external current source coupled to the current controller 100 via coupling 120***, or may be generated by a current source within the

current controller 100 provided at coupling 120. By either configuration, ***the reference current is precisely controlled to achieve a corresponding gap control in MEMs device 150 when the current mirror is enabled by transmission gate 140***. In this manner, a gap size within the MEMs device 150 can be adjusted for a particular MEMs device 150 in an array of MEMs devices.

[0020] FIGS. 3 and 4 show exemplary timing diagrams for a control system. FIG. 3 demonstrates gap as a function of ideal charge control. Idea charge control is achieved by coupling an ideal (fully voltage compliant) current source to the MEMS actuator and modulating the on time of the ideal current source (Q=i*dt). Gap is essentially a linear function of charge, and full gap control range is shown. Current (A) refers to the current mirrored onto a controlled current output by the current mirror. Charge (fC) refers to the charge between the movable plate and the fixed plate within MEMs device 150 (the amount of charge being put on a MEMs device 150 is a function of current magnitude and pulsewidth by Q=I*dt). Capacitance (fF) refers to the capacitance between the movable plate and the fixed plate within MEMs device 150. Voltage (V) refers to the voltage difference between ***the movable plate and the fixed plate within MEMs device 150***. Gap (Ang) refers to the distance between the movable plate and the fixed plate within MEMs device 150.

[0025] A method of controlling a gap between at least one fixed plate and an electrostatically movable plate in a MEMs device according to another embodiment of the present invention is shown in the flow chart of FIG. 7. In step 710, if desired, a reference current can be adjusted to represent the desired gap between the fixed plate and the electrostatically movable plate. In step 720 ***a control signal is then time modulated to represent a desired gap between the electrostatically movable plate and the fixed plate.*** The reference current is then selectively mirrored in step 730 onto a controlled current output coupled to a MEMs device on the basis of the time modulated control signal. This controlled current output then results in displacement of the electrostatically movable plate in step 740. In this manner, the desired gap size in the MEMs device can be achieved. As with other embodiments, this method may be replicated for use with a plurality of MEMs devices, such as in an array of MEMs devices.

(Emphasis added.)

Based on the figures and passages cited above, Applicants submit that the corresponding structure is either implicitly or inherently set forth in the written description. Accordingly, Applicants request that the rejection be withdrawn and claim 34 be allowed.

Claim Rejections under 35 U.S.C. § 102

Claims 13-19 and 34 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,662,029 ("Eden"). In response, Applicants traverse the rejection for the reasons set forth below.

Applicants rely on M.P.E.P. § 2131, entitled "Anticipation – Application of 35 U.S.C. § 102(a), (b) and (e)" which states, "a claim is anticipated only if each and every element set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

Applicants respectfully submit that Eden does not describe each and every element of the claims.

Independent claim 13 is directed to a method of controlling a gap between at least one fixed plate and an electrostatically movable plate in a MEMs device. Independent claim 34 is directed to an apparatus for controlling a gap between at least one fixed plate and an electrostatically movable plate in a MEMs device. In addition to other steps, independent claim 13 recites "***time modulating a control signal to a controlled current output that is variable voltage compliant*** to represent a desired gap between the fixed plate and the electrostatically movable plate." Similarly, independent claim 34 recites a "means for selectively setting ***a reference current onto a controlled current output that is variable voltage compliant***, the controlled current output coupled to the MEMs device ***on the basis of the time modulated control signal***." Accordingly, by modulating the current source/control signal the claimed method and apparatus can achieve ideal charge control on a MEMs device which in turn allows for more precise control of the MEMS device.

In contrast, Eden does not disclose, teach or suggest each and every element recited in independent claims 13 and 34.

Eden is directed to an HTS tunable filter with an adjustable capacitance gap. The Office Action asserts that Col. 10, lines 17-28 meets the claim limitation "time modulating a control signal to a controlled current output that is variable voltage compliant to represent a desired gap between the fixed plate and the electrostatically movable plate" as recited in claim 1. Applicants respectfully disagree.

The passages cited by the examiner disclose that in one embodiment, each piezoelectric driver is coupled to a tuning signal having a tuning signal voltage, Vt through electrodes 105. With positive voltage Vt, the first and fourth piezoelectric drivers 100 and 130 get shorter and the second and third piezoelectric drivers 115 and 120 lengthen, driving the floating plate 30 closer toward the fixed plates 10 and 15, decreasing the gap 50 and increasing the capacitance. Analogously, in the same embodiment, a negative voltage Vt would lengthen the first and fourth piezoelectric drivers 100 and 130 and shorten the second and third piezoelectric drivers 115 and 120. Thus, with a negative voltage Vt, the gap 50 between the plates increases, decreasing the capacitance.

Accordingly, the capacitance gap is adjusted by alternating the polarity of a tuning signal voltage. However, alternating the polarity of a tuning signal voltage is not "***time modulating a control signal to a controlled current output that is variable voltage compliant*** to represent a desired gap between the fixed plate and the electrostatically movable plate" as claimed in claim 13 or "means for selectively setting ***a reference current onto a controlled current output that is variable voltage compliant***, the controlled current output coupled to the MEMs device ***on the basis of the time modulated control signal***" as claimed in claim 34. That is, Eden fails to disclose, teach or suggest time modulating a control signal and using a current output to control the distance between the fixed plate and the electrostatically movable plate.

M.P.E.P. § 2131 states that "[t]he identical invention must be shown in as complete detail as is contained in the...claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989). The elements must be arranged as required by the claim. *See In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). Here, Eden fails to disclose each and every limitation in as complete detail as is contained in amended independent claims 13 and 34.

Accordingly, Applicants respectfully request that the rejection be withdrawn and independent claims 13 and 34 be allowed. Further, claims 14-19 depend from claim 13 and should be allowed for the reasons set forth above.

If this rejection of the claims is maintained, the examiner is respectfully requested to point out where the above-mentioned features are disclosed in Eden.

Conclusion

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 C.F.R. § 1.25. Additionally, charge any fees to Deposit Account 08-2025 under 37 C.F.R. § 1.16 through § 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees.

Respectfully submitted,

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